

What is Claimed is:

1. A fuel cell component comprising:
an electrolyte membrane; and
a plurality of insert members disposed in the electrolyte membrane that provide resistance to creep in the electrolyte membrane that would otherwise result from a compression force applied substantially perpendicular to a surface of said electrolyte membrane.
2. The fuel cell component according to claim 1, wherein said insert members have a greater creep resistance than that of the electrolyte membrane.
3. The fuel cell component according to claim 1, wherein said insert members have a greater mechanical rigidity than that of the electrolyte membrane.
4. The fuel cell component according to claim 1, wherein the plurality of insert members have an average outer dimension that is greater than 5 μm and no greater than a thickness of the electrolyte membrane.
5. The fuel cell component according to claim 1, wherein

the electrolyte membrane comprises a polymer electrolyte and the insert members are incorporated into the polymer electrolyte membrane in an amount ranging from 1% to 50% by volume.

6. The fuel cell component according to claim 1, wherein the plurality of insert members comprise PTFE and have an average outer dimension that is greater than 5 μm and no greater than a thickness of the electrolyte membrane.

7. The fuel cell component according to claim 1, wherein the average outer dimension of the plurality of insert members is approximately 30 μm .

8. The fuel cell component according to claim 1, wherein the insert members comprise glass and have an average outer dimension that is greater than 5 μm and no greater than a thickness of the electrolyte membrane.

9. The fuel cell component according to claim 1, wherein the insert members comprise a material made of one of copper, aluminum, titanium, zirconia, aluminum nitride, SiC, and quartz glass.

10. The fuel cell component according to claim 1, wherein the

insert members comprise a material made of one of titanium, zirconia, aluminum nitride, and quartz glass.

11. The fuel cell component according to claim 1, wherein the electrolyte membrane is produced from a polymer electrolyte solution having an EW value in the range of 900 to 1100.

12. The fuel cell according to claim 11, wherein the EW value of the electrolyte membrane is substantially different from the EW value of the insert members.

13. The fuel cell according to claim 11, wherein the EW value of the electrolyte membrane is substantially the same as the EW value of the insert member.

14. The fuel cell according to claim 11, wherein the glass transition temperature of the electrolyte membrane is substantially different from the glass transition temperature of the insert member.

15. The fuel cell component according to any of claims 1-3, wherein a structure of the main chain moiety of the insert member is the same as the main chain moiety of the electrolyte membrane.

16. The fuel cell component according to claim 1, wherein the plurality of insert members comprise PTFE, have an average outer dimension in the range of about 5 to 15 μm , and amount to not less than 1% by volume of the electrolyte membrane an insert members in combination.

17. The fuel cell component according to claim 1, wherein the insert members provide increased threshold stress of the electrolyte membrane against plastic deformation.

18. The fuel cell component according to claim 1, further comprising a structure applying a compressive load against the electrolyte membrane, wherein the plurality of insert members do not directly support the compressive load.

19. The fuel cell component according to claim 1, wherein the plurality of insert members comprising a fine leaf glass powder.

20. A fuel cell stack comprising:
first and second end plate assemblies;
a fuel cell assembly interposed between said first and second end plate assemblies and comprising fuel cell components each comprising an electrolyte membrane and a plurality of insert

members disposed in the electrolyte membrane that provide resistance to creep in the electrolyte membrane that would otherwise result from a compression force applied substantially perpendicular to a surface of said electrolyte membrane and electrodes disposed on each side of said electrolyte membrane, said fuel cell components being laminated with a plurality of separators; and

a compression assembly that clamps said first and second end plate assemblies and said fuel cell assembly together to provide said compression force.

21. The fuel cell stack according to claim 20, wherein the insert members have a greater creep resistance than the electrolyte membrane.

22. The fuel cell stack according to claim 21, wherein the insert members comprise granular members.

23. The fuel cell stack according to claim 22, wherein the plurality of granular members have an average diameter that is approximately less than or equal to a thickness of the electrolyte membrane.

24. The fuel cell stack according to claim 22, wherein the plurality of granular members have an average diameter that is approximately greater than or equal to 5 μm .

25. The fuel cell stack according to claim 20, wherein the insert members comprise a material made of one of titanium, metal oxide, metal nitride, inorganic glass, and fluororesin.

26. The fuel cell stack according to claim 20, wherein the insert members comprise a material made of a polymer-compound whose structure of the main chain moiety is the same as that of a material of the electrolyte membrane.

27. The fuel cell component according to claim 1, wherein said insert members are granular members.

28. The fuel cell component according to claim 1, wherein said insert members are spherical members.

29. The fuel cell stack according to claim 20, wherein said insert members are spherical members.

30. A process for production of a fuel cell component, said

method comprising the steps of arranging a plurality of insert members in an electrolyte membrane to counteract creep that would otherwise result from a compression force applied substantially perpendicular to a surface of said electrolyte membrane.